Trend Study 23-6-03

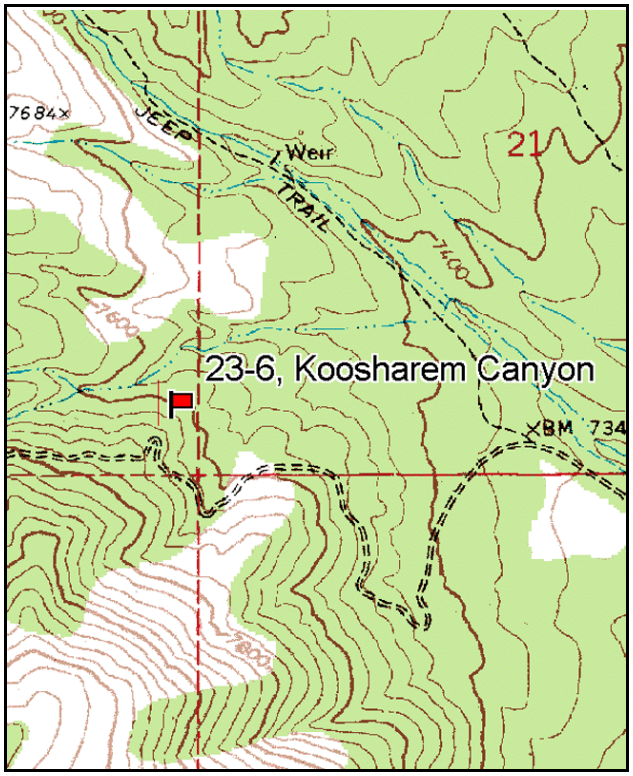
Study site name: Koosharem Canyon . Vegetation type: Mountain Brush .

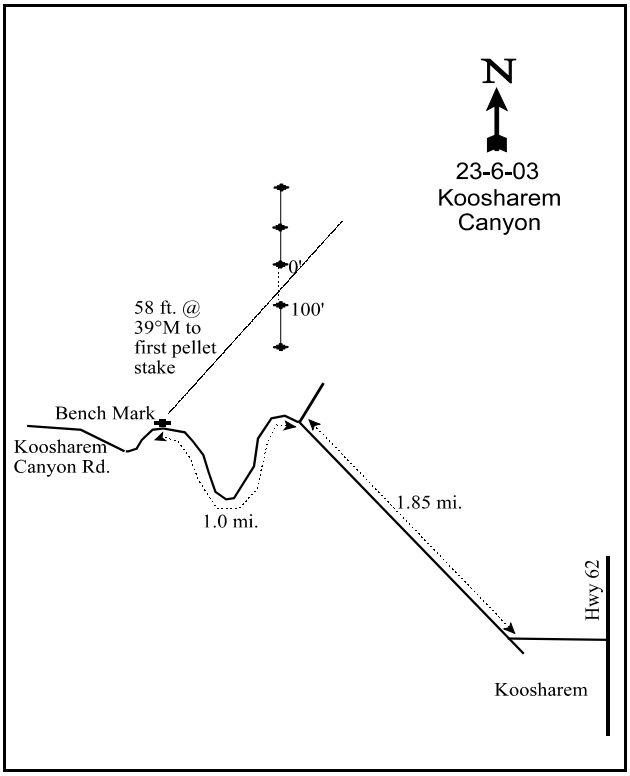
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft).

LOCATION DESCRIPTION

From the intersection next to the Koosharem LDS Ward Building go west 0.35 miles up the Koosharem Mountain Road. Bear right and go 0.05 miles to a fork. Take the left fork over a small bridge and proceed 1.85 miles to another fork. Turn left and go just over 1.0 mile to a hairpin turn that curves to the left. Stop at the apex of the curve. There is a benchmark here on the north side of the road. Take a bearing of 39 degrees and go 58 feet from the benchmark to find a short yellow rebar that marks a pellet group transect. From the first stake, the pellet group transect runs northeast (62-67 degrees) with stakes at intervals of about 50-60 feet. Count down 7 stakes, then go due north 50 feet to the baseline starting point. The 0-foot end of the baseline is marked by a steel rebar with browse tag #7042 attached. The baseline runs due south, crossing the pellet group transect.





Map Name: Koosharem

Diagrammatic Sketch

Township 26S , Range 1W , Section 20

GPS: NAD 27, UTM 12S 4264704 N, 419554 E

DISCUSSION

Koosharem Canyon - Trend Study No. 23-6

The Koosharem Canyon study samples a moderately high elevation winter range on the east side of the Monroe Mountain management unit. The site is located on a northeast, moderately steep slope (28%) at an elevation of 7,600 feet. The range type is mountain brush with 10 browse species present. Wildlife use appears to be year-round. Data from the nearby DWR pellet group transect showed moderate deer use since 1981 (Jense et al. 1985 & 1991). A pellet group transect read in conjunction with the vegetation transect in 1998 estimated 63 deer days use/acre (156 ddu/ha). Elk use was estimated at 31 days use/acre (77 edu/ha) and cattle at 5 days use/acre (12 cdu/ha) in 1998. Pellet group data from 2003 estimated even higher deer use at 113 days use/acre (279 ddu/ha). About 70% of the deer pellet groups appeared to be from spring and early summer use. Only a few elk pellet groups and 1 cattle pat was encountered in 2003. Cattle graze this Forest Service range during the summer. Past grazing pressure appears to have been very heavy.

Ground cover is highly variable on the site. The vegetation and litter cover provides the majority of the ground cover. Soil movement is detectable on trails and shrub interspaces where rocks and pavement and bare soil are predominant. The soil is prone to erosion, as seen on some steeper areas nearby. Erosion at the site is occurring but localized. The erosion condition class was determined to be stable to slight in 2003. The soil is rocky but also contains a fair amount of organic matter. Soil texture is a clay loam which is slightly acidic (pH 6.5). Effective rooting depth is good, estimated at just over 16 inches.

The hillside is dominated mainly by mountain big sagebrush and true mountain mahogany (*Cercocarpus montanus*). These two species alone provided 82% of the browse cover in 1998 and 77% in 2003. Further up the hill and to the south, large mature Utah juniper and curlleaf mountain mahogany (*Cercocarpus ledifolius*) are more prominent. Mountain big sagebrush is fairly dense at an estimated 3,420 plants/acre in 1998 and 4,400 plants/acre in 2003. Utilization has been moderate since 1985, when the site was established. A few plants displayed heavy browsing. Vigor has been generally good through the years with the exception of 1991, when 31% of the sagebrush sampled displayed poor vigor. The number of decadent plants was also exceptionally high that year at 65%. Vigor was good in 1998 and percent decadence declined to a more normal 26%. By 2003, the number of decadent plants increased slightly to 33%. Vigor remained good on most plants and seed production was excellent. Annual leader growth was low averaging only 1.3 inches. No seedlings were encountered in 2003, and young recruitment was poor.

True mountain mahogany, a long-lived species, provides abundant and preferred browse forage. Density has been moderately low with 1,066 plants/acre estimated in 1985, increasing slightly to 1,520 plants/acre by 2003. These plants have consistently received moderate to heavy use during each reading, peaking in 1991 and 2003 (60% and 72% heavily browsed). Vigor has remained good for most plants with a few decadent plants being encountered in 1998 and 2003. Annual leader growth was estimated at nearly 3 inches in 2003.

Utah serviceberry occurs in small numbers (140 plants/acre in 2003) but provides some additional preferred forage. It also received extremely heavy use in 1991 and 2003. About one-third of the population was classified as being decadent and displaying poor vigor in 2003. Other shrubs which provide some additional forage include curlleaf mountain mahogany, dwarf rabbitbrush, slenderbush eriogonum, bitterbrush, Gambel oak, and snowberry. Dwarf rabbitbrush and bitterbrush were both heavily browsed in 2003. Pinyon and juniper trees are scattered throughout the site. Point-center quarter data from 2003 estimated 51 pinyon and 39 juniper trees/acre with average diameters of 3.1 and 5.6 inches respectively.

Herbaceous vegetation is not abundant, producing a cover value of 13% in 1998 and 7% in 2003. The most common species are mutton bluegrass and a sedge (*Carex spp.*). Bluebunch wheatgrass and bottlebrush squirreltail make up the balance of the most abundant grasses. These grass and grass-like species provide

some spring and summer forage, but the community is lacking a desirable high-yielding herbaceous species. Bluebunch wheatgrass could fill this need, but it occurs in very low numbers. Perennial grass sum of nested frequency has decreased substantially since 1991.

There are a variety of forbs on the site, but density is very low and most are small and low-growing. Thus they are only a minor forage source. Some of the more common species include longleaf phlox, scarlet globemallow, clover, dusty penstemon, and sulphur eriogonum. Utilization of these forbs appears to be light.

1985 APPARENT TREND ASSESSMENT

Soil conditions on the site appear to be declining as erosion continues on localized areas of the slope. An increase in basal vegetative cover from new growth of the grasses and forbs will help hold the soil in place. The grasses are vigorous and appear to be recovering from past heavy grazing pressure. The key species, mountain big sagebrush and true mountain mahogany, may also be increasing. They both have a high percentage of young plants in their respective populations. They are moderately browsed, in good vigor, and have good leader growth. However, encroachment of Gambel oak could become a problem in the future.

1991 TREND ASSESSMENT

The soil trend is considered slightly down because vegetative basal cover is down and percent bare ground is up to 29%. Serviceberry, big sagebrush, and true mountain mahogany are all decreasing in density and have increased decadence rates. This would indicate a downward trend that should be watched closely. The majority of the grasses and forbs have shown increases in nested and quadrat frequency values, indicating an overall upward trend for the herbaceous understory.

TREND ASSESSMENT
soil - slightly down (2)
browse - down (1)
herbaceous understory - up slightly (4)

1998 TREND ASSESSMENT

The soil trend is considered stable with a slight decrease in percent bare soil and a corresponding decrease in herbaceous cover. Trend for the key browse is up slightly. Sagebrush shows improved vigor and a decline in the number of decadent plants (65% to 26%). Young recruitment remains good. True mountain mahogany appears stable with less heavy use. Trend for herbaceous species is down due to declines in nested frequency values for both grasses and forbs. Total herbaceous production is poor with cover estimated at only 13%.

TREND ASSESSMENT
soil - stable (3)
browse - up slightly (4)
herbaceous understory - down (1)

2003 TREND ASSESSMENT

Trend for soil remains stable with similar ground cover characteristics compared to 1998 estimates. Protective ground cover is variable with some localized erosion occurring on the site. Overall, the erosion condition class was determined to be stable to slight. Trend for browse is stable. Mountain big sagebrush provided 51% of the browse cover in 2003. Use remained light to moderate with heavy use on 10% of the plants sampled. Vigor was good on most plants and percent decadence remained relatively stable (26% to 33%). Young recruitment is currently marginal with 3% of the population consisting of young plants.

Mountain mahogany accounts for 26% of the browse cover. This preferred shrub shows a stable trend with increased heavy use, good vigor and low decadence. Trend for the herbaceous understory is slightly down. This downward trend has continued since 1991. Current herbaceous production is poor with only 7% cover of grasses and forbs being estimated in 2003. Sum of nested frequency of grasses and forbs has also declined since the last reading. Shrub cover is increasing while the herbaceous cover is declining.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --
Management unit 23 , Study no: 6

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron smithii	a-	b24	a5	a5	.03	.01
G	Agropyron spicatum	a10	b49	ab32	a21	.83	.76
G	Bouteloua gracilis	-	-	2	-	.00	-
G	Bromus tectorum (a)	-	-	-	1	-	.00
G	Carex spp.	d221	c179	b109	a54	2.02	1.37
G	Oryzopsis hymenoides	a-	ab8	b18	ab14	.70	.22
G	Poa fendleriana	b176	b183	a138	a138	8.00	3.93
G	Sitanion hystrix	a58	b110	a56	a32	.98	.33
G	Stipa lettermani	-	-	-	8	-	.24
Total for Annual Grasses		0	0	0	1	0	0.00
Total for Perennial Grasses		465	553	360	272	12.58	6.87
Total for Grasses		465	553	360	273	12.58	6.88
F	Agoseris glauca	-	6	-	-	-	-
F	Antennaria rosea	1	3	-	6	-	.03
F	Androsace septentrionalis (a)	-	-	b14	a-	.06	-
F	Arabis spp.	-	-	3	-	.00	-
F	Astragalus lentiginosus	6	7	5	-	.03	-
F	Castilleja chromosa	a-	b16	a-	a-	-	-
F	Calochortus nuttallii	a-	b17	a-	a-	-	-
F	Crepis acuminata	ab3	b13	a-	a-	-	-
F	Cryptantha humilis	4	5	1	-	.03	-
F	Descurainia pinnata (a)	-	-	2	3	.00	.01
F	Erigeron eatonii	5	3	-	-	-	-
F	Eriogonum racemosum	-	-	4	-	.03	-
F	Eriogonum umbellatum	a5	b16	a3	a-	.03	-

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
F	Lappula occidentalis (a)	-	-	$_{a}$-	$_{b}$10	-	.02
F	Lomatium spp.	$_{a}$-	$_{b}$12	$_{a}$-	$_{a}$-	-	-
F	Machaeranthera canescens	5	-	-	-	-	-
F	Penstemon comarrhenus	6	2	8	5	.04	.06
F	Phlox longifolia	$_{b}$40	$_{c}$69	$_{a}$7	$_{a}$4	.01	.01
F	Potentilla gracilis	-	-	1	-	.03	-
F	Sphaeralcea coccinea	$_{b}$28	$_{ab}$17	$_{a}$5	$_{a}$-	.04	-
F	Taraxacum officinale	1	-	-	-	-	-
F	Tragopogon dubius	-	-	1	-	.00	-
F	Trifolium spp.	$_{b}$21	$_{c}$37	$_{a}$2	$_{a}$3	.00	.00
F	Unknown forb-perennial	5	-	-	-	-	-
F	Wyethia amplexicaulis	5	-	-	-	-	-
F	Zigadenus paniculatus	2	-	-	-	-	-
Total for Annual Forbs		0	0	16	13	0.07	0.03
Total for Perennial Forbs		137	223	40	18	0.27	0.11
Total for Forbs		137	223	56	31	0.34	0.14

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 23 , Study no: 6

Type	Species	Strip Frequency '98	Strip Frequency '03	Average Cover % '98	Average Cover % '03
B	Amelanchier utahensis	10	6	.36	.15
B	Artemisia tridentata vaseyana	91	92	17.00	15.68
B	Cercocarpus ledifolius	1	0	-	-
B	Cercocarpus montanus	44	50	6.75	8.14
B	Chrysothamnus depressus	5	6	.33	.03
B	Chrysothamnus viscidiflorus viscidiflorus	6	3	.03	.18
B	Eriogonum microthecum	15	17	.42	.34
B	Juniperus osteosperma	3	5	.00	.76
B	Mahonia repens	1	0	-	-
B	Opuntia spp.	21	24	.23	.57
B	Pediocactus simpsonii	2	1	.01	.00
B	Pinus edulis	3	3	.18	.33
B	Purshia tridentata	8	8	.16	.30
B	Quercus gambelii	11	11	1.54	2.71
B	Symphoricarpos oreophilus	31	32	1.77	1.74
Total for Browse		252	258	28.80	30.96

CANOPY COVER, LINE INTERCEPT --
Management unit 23 , Study no: 6

Species	Percent Cover '03
Amelanchier utahensis	.13
Artemisia tridentata vaseyana	12.36
Cercocarpus montanus	8.06
Chrysothamnus viscidiflorus viscidiflorus	.25
Eriogonum microthecum	.31
Juniperus osteosperma	1.68
Opuntia spp.	.26
Pinus edulis	1.31
Purshia tridentata	1.06
Quercus gambelii	2.79
Symphoricarpos oreophilus	1.20

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 23 , Study no: 6

Species	Average leader growth (in) '03
Artemisia tridentata vaseyana	1.3
Cercocarpus montanus	2.9
Purshia tridentata	2.4

POINT-QUARTER TREE DATA --
Management unit 23 , Study no: 6

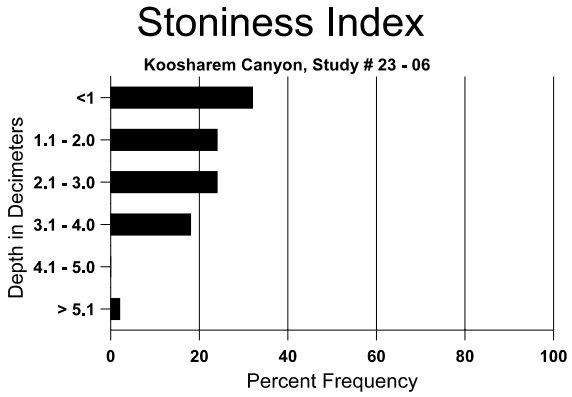
Species	Trees per Acre '98	Trees per Acre '03	Average diameter (in) '98	Average diameter (in) '03
Juniperus osteosperma	42	39	2.5	5.6
Pinus edulis	30	51	2.8	3.1

BASIC COVER --
Management unit 23 , Study no: 6

Cover Type	Average Cover % '85	'91	'98	'03
Vegetation	9.25	5.25	37.37	37.10
Rock	11.25	10.25	9.54	12.19
Pavement	13.00	7.75	14.62	7.19
Litter	49.00	47.25	47.14	43.18
Cryptogams	0	.25	.00	.15
Bare Ground	17.50	29.25	23.75	19.78

SOIL ANALYSIS DATA --
Management unit 23, Study no: 6, Study Name: Koosharem Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
16.2	58.7 (16.5)	6.5	40.0	25.4	34.6	4.2	26.8	243.2	0.6



PELLET GROUP DATA --
Management unit 23 , Study no: 6

Type	Quadrat Frequency	
	'98	'03
Rabbit	50	34
Elk	10	-
Deer	45	42
Cattle	1	-

Days use per acre (ha)	
'98	'03
-	-
31 (77)	2 (5)
63 (156)	113 (279)
5 (12)	1 (2)

BROWSE CHARACTERISTICS --
Management unit 23 , Study no: 6

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Amelanchier utahensis											
85	**599**	266	533	66	-	-	33	0	0	0	13/9
91	**332**	-	266	-	66	-	0	60	20	0	-/-
98	**240**	-	80	160	-	-	25	0	0	0	25/21
03	**140**	-	-	100	40	-	14	71	29	29	22/16
Artemisia tridentata vaseyana											
85	**7599**	1066	3066	2933	1600	-	37	2	21	6	39/33
91	**5732**	-	533	1466	3733	-	56	6	65	31	31/26
98	**3420**	60	320	2200	900	480	33	6	26	2	29/31
03	**4400**	-	140	2820	1440	1300	32	10	33	7	24/27
Cercocarpus ledifolius											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**20**	-	-	20	-	-	100	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Cercocarpus montanus											
85	**1066**	66	666	400	-	-	44	0	0	0	34/19
91	**666**	-	333	333	-	-	30	60	0	0	49/21
98	**1360**	-	180	1060	120	40	49	24	9	1	33/37
03	**1520**	-	60	1340	120	-	18	72	8	8	33/35
Chrysothamnus depressus											
85	**1599**	-	666	933	-	-	0	0	0	0	5/5
91	**1399**	-	66	133	1200	-	0	100	86	0	2/3
98	**160**	-	-	160	-	-	63	0	0	0	3/10
03	**260**	-	-	260	-	-	38	54	0	0	6/9

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus viscidiflorus											
85	**266**	133	133	133	-	-	0	0	0	0	10/7
91	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**140**	-	-	120	20	-	0	0	14	14	15/14
03	**60**	-	-	20	40	-	0	0	67	33	14/10
Eriogonum microthecum											
85	**66**	66	-	66	-	-	0	0	0	0	7/4
91	**0**	-	-	-	-	-	0	0	0	0	-/-
98	**780**	-	160	620	-	-	3	0	0	0	10/12
03	**860**	-	20	780	60	20	0	2	7	5	7/7
Juniperus osteosperma											
85	**465**	200	266	133	66	-	14	0	14	0	69/157
91	**333**	66	133	200	-	-	20	0	0	0	71/43
98	**60**	20	20	40	-	-	0	0	0	0	-/-
03	**100**	-	40	60	-	-	0	0	0	0	-/-
Mahonia repens											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**60**	-	-	60	-	-	0	0	-	0	4/7
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Opuntia spp.											
85	**933**	-	133	800	-	-	0	0	0	0	7/10
91	**666**	-	-	-	666	-	40	0	100	80	-/-
98	**620**	20	100	520	-	-	0	0	0	13	6/14
03	**940**	-	20	920	-	-	0	0	0	0	4/9
Pediocactus simpsonii											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**40**	-	20	20	-	-	0	0	-	0	-/-
03	**20**	-	-	20	-	-	0	0	-	0	2/3
Pinus edulis											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	66	-	-	-	-	0	0	-	0	-/-
98	**60**	-	20	40	-	-	0	0	-	0	-/-
03	**60**	-	40	20	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Purshia tridentata											
85	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
98	**180**	-	40	140	-	-	33	22	-	0	24/35
03	**200**	-	-	200	-	-	30	70	-	0	17/36
Quercus gambelii											
85	**733**	333	600	133	-	-	0	0	0	0	42/21
91	**666**	-	400	266	-	-	50	10	0	0	59/18
98	**960**	80	540	360	60	120	52	8	6	0	35/28
03	**940**	-	420	500	20	80	30	28	2	0	43/29
Symphoricarpos oreophilus											
85	**1133**	200	600	533	-	-	0	0	0	0	14/10
91	**2466**	-	2133	200	133	-	27	3	5	0	11/11
98	**1540**	20	580	940	20	-	17	0	1	0	12/19
03	**2240**	-	160	2040	40	-	0	2	2	2	10/14